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Specification and Drawings, as originally filed, with Application for Patent Serial No: **2,455,798**, on January 23, 2004, by **D.I.T. EQUIPEMENTS INC.**, assignee of Eric Milot, for "Apparatus for Longitudinally Aligning Concrete Blocks on a Conveyor".

Agent certificateur/Certifying Officer

April 13, 2005
Date

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ABSTRACT

An apparatus provided for orienting concrete blocks into a desired position comprises a pair of upper and lower turntables including respectively upper and lower block supporting surfaces. The lower supporting surface extends outwardly of, and below, the upper supporting surface. A stationary peripheral wall extends outwardly of the lower turntable and defines with the upper turntable and the lower supporting surface a gutter. The gutter is dimensioned to receive blocks therein in a substantially longitudinal orientation thereof. An outlet is provided at a downstream end of the gutter for allowing the substantially oriented blocks to be discharged from the apparatus. Therefore, concrete blocks, or the like, fed to the apparatus are received by the upper turntable, are then positioned by the rotation of the upper and lower turntables in the gutter, and are discharged from the apparatus via the outlet.

APPARATUS FOR LONGITUDINALLY ALIGNING CONCRETE BLOCKS ON A CONVEYOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to concrete blocks and, more particularly, to an apparatus for positioning concrete blocks on a conveyor.

2. Description of the Prior Art

Concrete blocks that need to be handled for various purposes are often delivered in bulk. If the blocks are simply dropped on a conveyor, it becomes very difficult to then handle these blocks via automated machines. It is therefore desirable to facilitate the handling of these blocks to position them, for instance on a conveyor, typically in spaced succession thereon so that there is an expectancy of position of the blocks, whereby each block can be then be handled in an organized manner, e.g. via timed machinery.

Rotating turntables that receive such concrete blocks in bulk are used for delivering the blocks tangentially on an output conveyor that then carries the blocks downstream for further handling thereof. The rotation of the turntable causes the blocks to be delivered tangentially onto the conveyor in a spaced manner.

SUMMARY OF THE INVENTION

It is therefore an aim of the present invention to provide a novel apparatus for receiving concrete blocks in bulk and for delivering such blocks downstream of the apparatus in a more organized manner for subsequent handling thereof.

Therefore, in accordance with the present invention, there is provided an apparatus for orienting blocks into a desired position, comprising a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, a peripheral wall outwardly spaced from said upper supporting surface, said upper turntable, said lower supporting surface and said peripheral wall defining a gutter dimensioned to receive blocks therein in a substantially longitudinal orientation thereof, an outlet provided at a downstream end of said gutter for allowing substantially oriented blocks to be discharged from said apparatus, whereby blocks fed to said apparatus are received by said upper turntable, are positioned by said apparatus in said gutter and are discharged from said apparatus via said outlet.

Also in accordance with the present invention, there is provided a method for orienting blocks into a desired position, comprising the steps of:

(a) providing a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, said lower turntable being configured and sized so that blocks completely received thereon are in a substantially longitudinal orientation thereof;

(b) feeding blocks on said upper turntable with a rotation of said upper and lower turntables causing the blocks to take position on said lower supporting surface in said substantially longitudinal orientation; and

(c) discharging the blocks in said substantially longitudinal orientation from said lower turntable.

Further in accordance with the present invention, there is provided an apparatus for orienting objects into a desired position, comprising a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, a peripheral wall outwardly spaced from said upper supporting surface, said upper turntable, said lower supporting surface and said peripheral wall defining a gutter dimensioned to receive objects therein in a substantially longitudinal orientation thereof, an outlet provided at a downstream end of said gutter for allowing substantially oriented objects to be discharged from said apparatus, whereby objects fed to said apparatus are received by said upper turntable, are positioned by said apparatus in said gutter and are discharged from said apparatus via said outlet.

Still further in accordance with the present invention, there is provided a method for orienting objects into a desired position, comprising the steps of:

(a) providing a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, said lower turntable being configured and sized so that objects completely received thereon are in a substantially longitudinal orientation thereof;

(b) feeding objects on said upper turntable with a rotation of said upper and lower turntables causing the objects to take position on said lower

supporting surface in said substantially longitudinal orientation; and

(c) discharging the objects in said substantially longitudinal orientation from said lower turntable.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus generally described the nature of the invention, reference will now be made to the accompanying drawings, showing by way of illustration a preferred embodiment thereof, and in which:

Fig. 1 is a top plan view of an apparatus in accordance with the present invention, for longitudinally aligning concrete blocks on a conveyor, wherein there are also shown an input tumbler and output conveyor as well as concrete blocks;

Fig. 2 is a top plan view, with details, of the apparatus of Fig. 1;

Fig. 3 is a vertical cross-sectional view of the apparatus taken along line 3-3 of Fig. 2;

Fig. 4 is an enlarged view of a central portion of Fig. 3;

Fig. 5 is an enlarged view of a right-side portion of Fig. 3; and

Fig. 6 is a top plan view of part of the apparatus of Fig. 1, showing a sequential displacement of a concrete block up to a desired position thereof on the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs. 1 to 3 illustrate a concrete block handling apparatus A adapted for to longitudinally align concrete blocks B on an output conveyor C, the concrete blocks B being fed in bulk to the apparatus A via an input tumbler T. By having the concrete blocks B

longitudinally aligned on the conveyor C, it becomes easier to further handle, e.g. in an at least partly automated process, the concrete blocks B in one or more subsequent stations located downstream of the conveyor C. Figs. 4 and 5 are enlarged views that show more clearly some details of the apparatus A.

The apparatus A comprises a fixed base 10, a lower turntable 12 and an upper turntable 14. The fixed base 10 includes a pair of perpendicularly crossing horizontal support beams 16 and 18 that are mounted at upper ends of four (4) vertical posts. Centrally, a cylindrical support member 22 extends from the horizontal support beams 16 and 18. A first motor 24, provided with a first pinion 26 on its output shaft, is mounted to the horizontal support beam 18 via a bracket 28. The first motor 24, as will be described hereinafter, is adapted to rotatably drive the lower turntable 12.

A second motor 30, provided with a second pinion 32 on its output shaft, is mounted inwardly of the cylindrical support member 22. The second motor 32, also as will be described hereinafter, is adapted to rotatably drive the upper turntable 14.

A lower annular flange 34 is fixedly mounted horizontally around the cylindrical support member 22. A first toothed wheel 36, having teeth 38 on an outer periphery thereof, is rotatably mounted about the cylindrical support member 22 via a first ball bearing 40, an inner section of the first ball bearing 40 being fixedly mounted to the lower flange 34, whereas an outer section of the first ball bearing 40 is connected to the first toothed wheel 36. As the teeth 38 of the first toothed wheel 36 are in meshed engagement with the first pinion 26, actuation of the first motor 24 will cause the first pinion 26 to rotate thereby rotating the first toothed wheel 36.

The first toothed wheel 36 is connected to a superposed lower annular plate 44 of the lower turntable 12 via pins 42 such as to impart rotation thereto when the first motor 24 is operating. The lower turntable 12 also includes a number of structural members 46 and a support table 48, the structural members 46 fixedly joining the annular plate 44 to the support table 48. The support table 48 is adapted to receive thereon and to convey, in view of its rotation, the concrete blocks B to the output conveyor C, as will be described hereinafter.

The fixed base 10 comprises secondary posts 50 that extend vertically upwardly from the horizontal support beams 16 and 18. A C-channel 52 mounted atop the secondary posts 50 extends substantially completely around the lower turntable 12 and slightly outwardly thereof. A vertical wall 54 is mounted on an inner side of the C-channel 52, just exteriorly of an outer edge of the support table 48.

An upper annular flange 55 is fixedly mounted horizontally on top of the cylindrical support member 22. A second toothed wheel 56, having teeth 58 on an inner surface thereof, is rotatably mounted above the cylindrical support member 22 via a second ball bearing 60, an outer section of the second ball bearing 60 being fixedly mounted to the upper flange 55, whereas an inner section of the second ball bearing 60 is connected to the second toothed wheel 56. As the teeth 58 of the second toothed wheel 56 are in meshed engagement with the second pinion 32, actuation of the second motor 30 will cause the second pinion 32 to rotate thereby rotating the second toothed wheel 56.

The second toothed wheel 56 is connected to a superposed lower circular plate 64 of the upper turntable 14 via pins 62 such as to impart rotation thereto when the second motor 30 is operating. The upper turntable 14

also includes an upstanding cylinder 66 extending upwardly from the circular plate 64 and an annular table 68 fixedly mounted around a lower end of the cylinder 66 and atop the edge of the circular plate 64.

A frusto-conical structure 70 is provided around the cylinder 66 and atop the annular table 68, with a support surface 72 of the table 68 extending outwardly from a lower end 74 of the frusto-conical structure 70 up to a vertical peripheral wall 76 of the annular table 68. The support surface 72 is adapted to receive thereon and to convey, in view of its rotation, the concrete blocks B to the support table 48 of the lower turntable 12, which itself, as previously mentioned, carries the concrete blocks B to the output conveyor C.

The vertical wall 76 of the annular table 68 of the upper turntable 14, the support table 48 of the lower turntable 12 and the stationary vertical wall 54 define a channel-shaped gutter 78 adapted to receive the concrete blocks B therein, from the upper turntable 14, in such a way that the concrete blocks B are oriented longitudinally therein to allow the lower turntable 12 to convey the concrete blocks B onto the output conveyor C. The width of the gutter 78 is less than the length of the concrete blocks B and is slightly larger than the width thereof such that the concrete blocks B can only be received on the lower turntable 12 if they are in their longitudinal orientation. The height of the vertical wall 76 of the annular table 68 can be of approximately 1 inch (2.54 cm).

As best seen in Figs. 2 and 5, the gutter 78 extends substantially all around the apparatus A, except at the level of the vertical wall 54 which includes, opposite the output conveyor C, a straight section 80 that extends tangentially to the outside edge of the

support table 48 and, in fact, also to a curved remainder of the vertical wall 54. A stationary vertical guide plate 82 extends parallelly to the straight section 80 of the vertical wall 54 and tangentially to the vertical wall 76 of the annular table 68 of the upper turntable 14. Outwardly of the support table 48 of the lower turntable 12, there is provide a horizontal bottom wall 84 that connects together lower edges of the straight section 80 of the vertical wall 54 and of the guide plate 82. The straight section 80 of the vertical wall 54, the bottom wall 84 and the guide plate 82 form a straight discharge channel 86 that has a free downstream end 88 that overhangs an upstream end of the output conveyor C.

This arrangement causes the straight section 80 of the vertical wall 54 and the guide plate 82 to direct the concrete blocks B located on the support table 48 of the lower turntable 12 onto the discharge channel 86, which in turn conveys these concrete blocks B onto the output conveyor C.

The speed of the first and second motors 24 and 30 and/or the gear ratios between the first and second pinions 26 and 32 and the first and second toothed wheels 36 and 56, respectively, is such that lower and upper turntables 12 and 14 rotate at different speeds, for reasons which will become clear hereinbelow. For instance, the apparatus A can be set up so that the lower and upper turntables 12 and 14 rotate at 15 and 23 RPM, respectively.

Mainly referring now to Fig. 1, the operation of the apparatus A is as follows. The tumbler T drops concrete blocks B onto the upper turntable 14 and typically onto the frusto-conical structure 70 thereof. Both the lower and upper turntables 12 and 14 rotate in a same direction (see arrows 90), but generally at different speeds, as mentioned hereinabove. The general

shape of the frusto-conical structure 70, including its slope, are such that the concrete blocks are directed onto the support surface 72 of the annular table 68 of the upper turntable 14, at which point the centrifugal force exerted by the support surface 72 on the concrete blocks B positioned thereon is sufficient to force the concrete blocks B outwardly towards and onto the support table 48 of the lower turntable 12, i.e. in the gutter 78.

If a concrete block (see block B' in Figs. 1 and 6) becomes partly engaged in the gutter 78, the difference in speeds between the lower and upper turntables 12 and 14 will cause this concrete block B' to gradually deflect until its longitudinal orientation is sufficiently close to a tangential direction of the lower turntable 12 that it will completely position itself, or drop, into the gutter 78, whereby the concrete block B' is longitudinally positioned in the gutter 78. Fig. 6 illustrates consecutive positions of such a concrete block B' from a substantially transversal position thereof with part thereof in the gutter 78, up to the block B' being longitudinally positioned in the gutter 78.

As previously mentioned, the concrete blocks B are then guidingly removed from the gutter 78 and lower turntable 12 by the straight section 80 of the vertical wall 54 and by the guide plate 82, which direct the concrete blocks B onto the discharge channel 86, which in turn carries these concrete blocks B onto the output conveyor C, whereby the concrete blocks are longitudinally aligned on the output conveyor C. This facilitates, e.g. via an automated process, the handling of the blocks B in one or more downstream stations, for instance in a palletising station that automatically loads the concrete blocks B on a pallet.

The upper turntable 14 may include on the support surface 72 thereof a series of bosses (not shown) of approximately 1/8 inch in height, which are provided at, or slightly inwardly of, the vertical wall 76 and which are distributed along the periphery of the support surface 72 at intervals of, for instance, 8 to 12 inches, and typically 8 inches. These bosses provide frictional areas that may assist in displacing the concrete blocks B positioned more or less sideways (as concrete block B' in Figs. 1 and 6) to the desired positioned thereof, i.e. where the longitudinal orientation of the blocks B is substantially parallel to a tangent of the vertical wall 76, thereby allowing the blocks B to become completely lodged in the gutter 78. Such bosses may be formed by spot welding (hard facing).

Instead of such bosses, small rubber patches could be embedded in the annular table 68 of the upper turntable 14 so as to be substantially flush with the support surface 72 thereof and being able to frictionally engage the blocks B to pivot the same into, or towards, the desired afore-described position.

As a further alternative, radially oriented fins can be provided on the support surface 72 of the annular table 68 of the upper turntable 14, the length of these fins being a function of the maximal length of the products that are to be sorted.

A volute or spiral-shaped guide can be fixedly mounted above the upper turntable 14, which is shaped and configured to "pre-align" the concrete blocks B before they release onto the support surface 72 of the annular table 68 of the upper turntable 14. This can reduce the amount of displacement that is required to be induced by the annular table 68 of the upper turntable 14 on the concrete blocks B so that the concrete blocks B can lower

in the desired position in the gutter 78, i.e. on the support table 48 of the lower turntable 12.

It is noted that the frusto-conical structure 70 can extend to the peripheral edge of the annular table 68 of the upper turntable 14, i.e. to, or close to, the vertical peripheral wall 76. In such a case, the angle of such a frusto-conical structure, with respect to the horizontal, could be less than that illustrated in Fig. 3. Such a frusto-conical structure can permit a reduced rotation speed of the upper turntable 14 as the force required to overcome friction forces between the concrete blocks B and the support surface 72 and so displace the concrete blocks B outwardly into the gutter 78 now includes, in view of the slope of the frusto-conical structure, a gravity force component that acts with the centrifugal force component on the concrete blocks B. Therefore, as the required centrifugal force component is less than if the support surface 72 is horizontal, the upper turntable 14 can be rotated at a lesser speed.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An apparatus for orienting blocks into a desired position, comprising a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, a peripheral wall outwardly spaced from said upper supporting surface, said upper turntable, said lower supporting surface and said peripheral wall defining a gutter dimensioned to receive blocks therein in a substantially longitudinal orientation thereof, an outlet provided at a downstream end of said gutter for allowing substantially oriented blocks to be discharged from said apparatus, whereby blocks fed to said apparatus are received by said upper turntable, are positioned by said apparatus in said gutter and are discharged from said apparatus via said outlet.

2. An apparatus as defined in Claim 1, wherein said upper and lower turntables rotate at different speeds.

3. An apparatus as defined in Claim 2, wherein said upper and lower turntables rotate in a same direction.

4. An apparatus as defined in Claim 1, wherein said upper turntable comprises a central sloped structure adapted for displacing the blocks received thereon towards said upper supporting surface.

5. An apparatus as defined in Claim 4, wherein said sloped structure includes a section substantially shaped as at least part of a cone.

6. An apparatus as defined in Claim 1, wherein said peripheral wall defines an outside limit of said gutter.

7. An apparatus as defined in Claim 6, wherein said peripheral wall is stationary with said upper and lower turntables rotating inwardly thereof.

8. An apparatus as defined in Claim 1, wherein said outlet includes a guide extending downstream of said gutter and adapted to receive blocks therefrom.

9. An apparatus as defined in Claim 8, wherein said guide comprises a pair of substantially straight, substantially parallel, substantially vertical stationary walls, said guide constituting a substantially tangential continuation of said gutter at said downstream end thereof.

10. An apparatus as defined in Claim 9, wherein an outside wall of said stationary walls of said guide is substantially a continuation of a downstream end of said peripheral wall.

11. An apparatus as defined in Claim 1, wherein said upper supporting surface is sloped outwardly downwardly towards said gutter.

12. An apparatus as defined in Claim 11, wherein said upper supporting surface includes a section substantially shaped as at least part of a cone, said section sloping towards said gutter.

13. An apparatus as defined in Claim 1, wherein said upper supporting surface is provided with deflecting members adapted to cause the blocks to displace.

14. An apparatus as defined in Claim 13, wherein said deflecting members comprise at least one bosses protruding upwardly from said upper supporting surface, frictional elements substantially flush with said upper supporting surface, and fins extending substantially radially onto said upper supporting surface.

15. A method for orienting blocks into a desired position, comprising the steps of:

(a) providing a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, said lower turntable being configured and sized so that blocks completely received thereon are in a substantially longitudinal orientation thereof;

(b) feeding blocks on said upper turntable with a rotation of said upper and lower turntables causing the blocks to take position on said lower supporting surface in said substantially longitudinal orientation; and

(c) discharging the blocks in said substantially longitudinal orientation from said lower turntable.

16. An apparatus for orienting objects into a desired position, comprising a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, a peripheral wall outwardly spaced from said upper supporting surface, said upper turntable, said lower supporting surface and said peripheral wall defining a

gutter dimensioned to receive objects therein in a substantially longitudinal orientation thereof, an outlet provided at a downstream end of said gutter for allowing substantially oriented objects to be discharged from said apparatus, whereby objects fed to said apparatus are received by said upper turntable, are positioned by said apparatus in said gutter and are discharged from said apparatus via said outlet.

17. A method for orienting objects into a desired position, comprising the steps of:

(a) providing a pair of upper and lower turntables including respectively upper and lower block supporting surfaces, said lower supporting surface extending outwardly of, and below, said upper supporting surface, said lower turntable being configured and sized so that objects completely received thereon are in a substantially longitudinal orientation thereof;

(b) feeding objects on said upper turntable with a rotation of said upper and lower turntables causing the objects to take position on said lower supporting surface in said substantially longitudinal orientation; and

(c) discharging the objects in said substantially longitudinal orientation from said lower turntable.

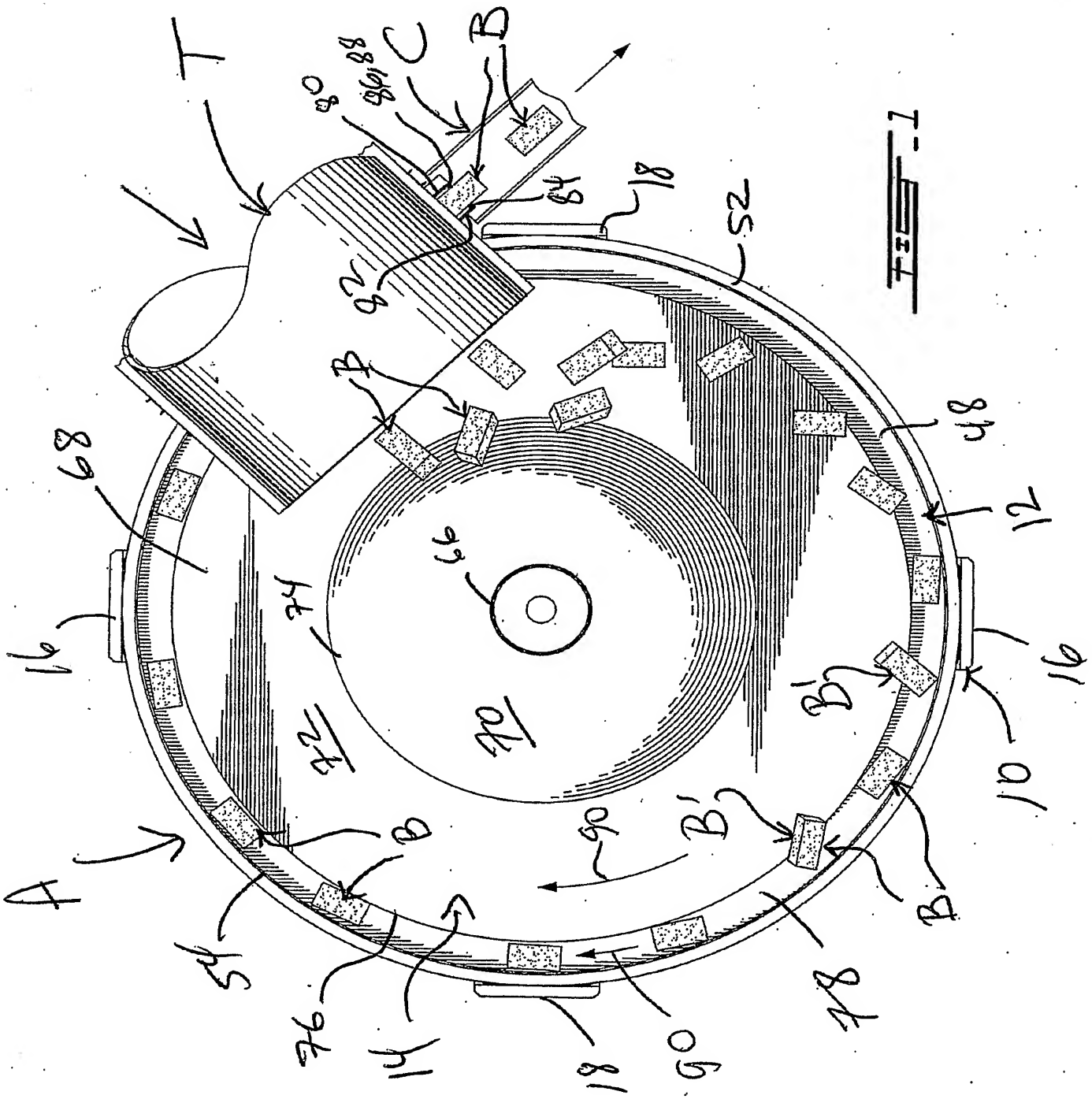
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Fig. 1

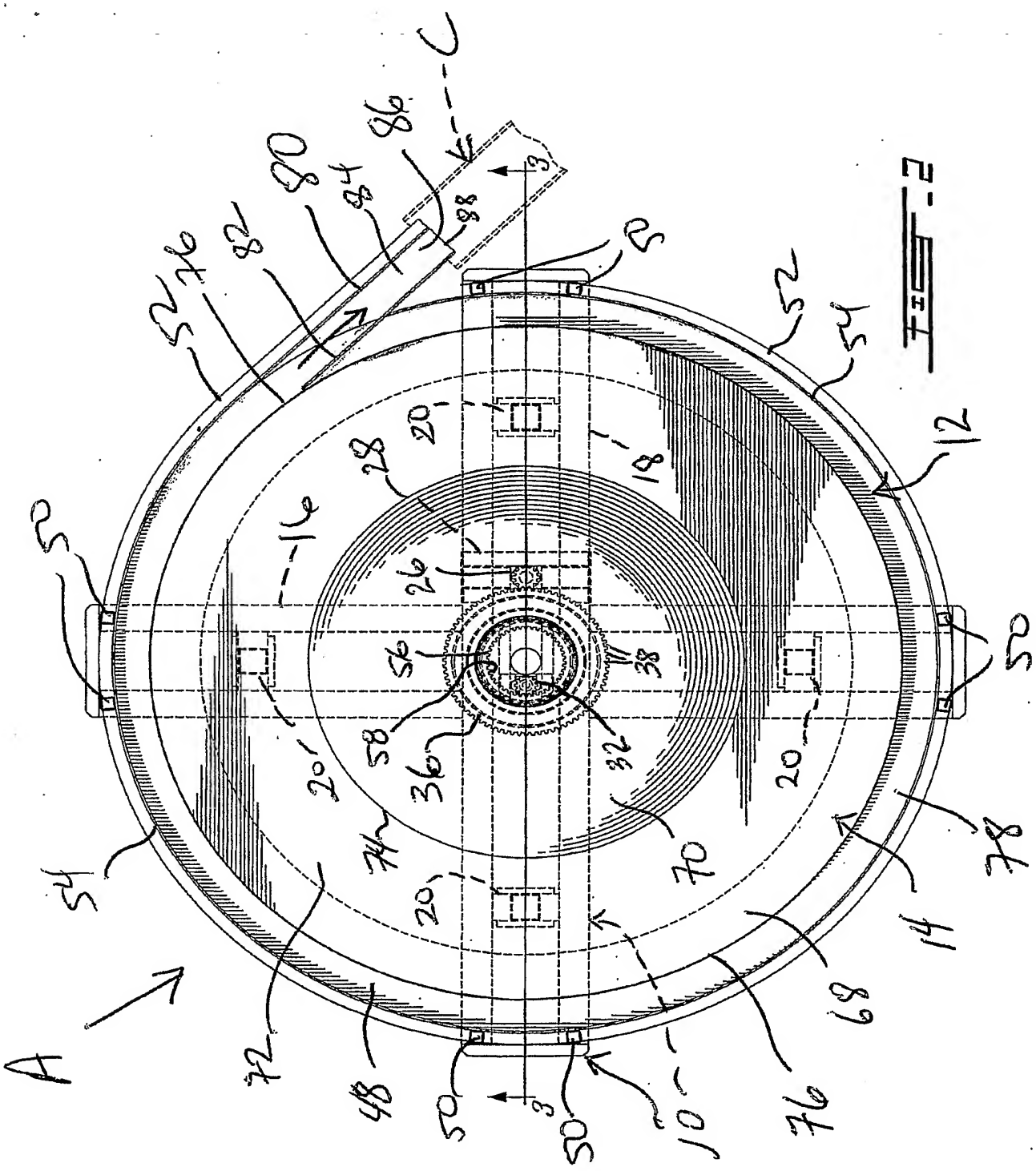
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FIG-2

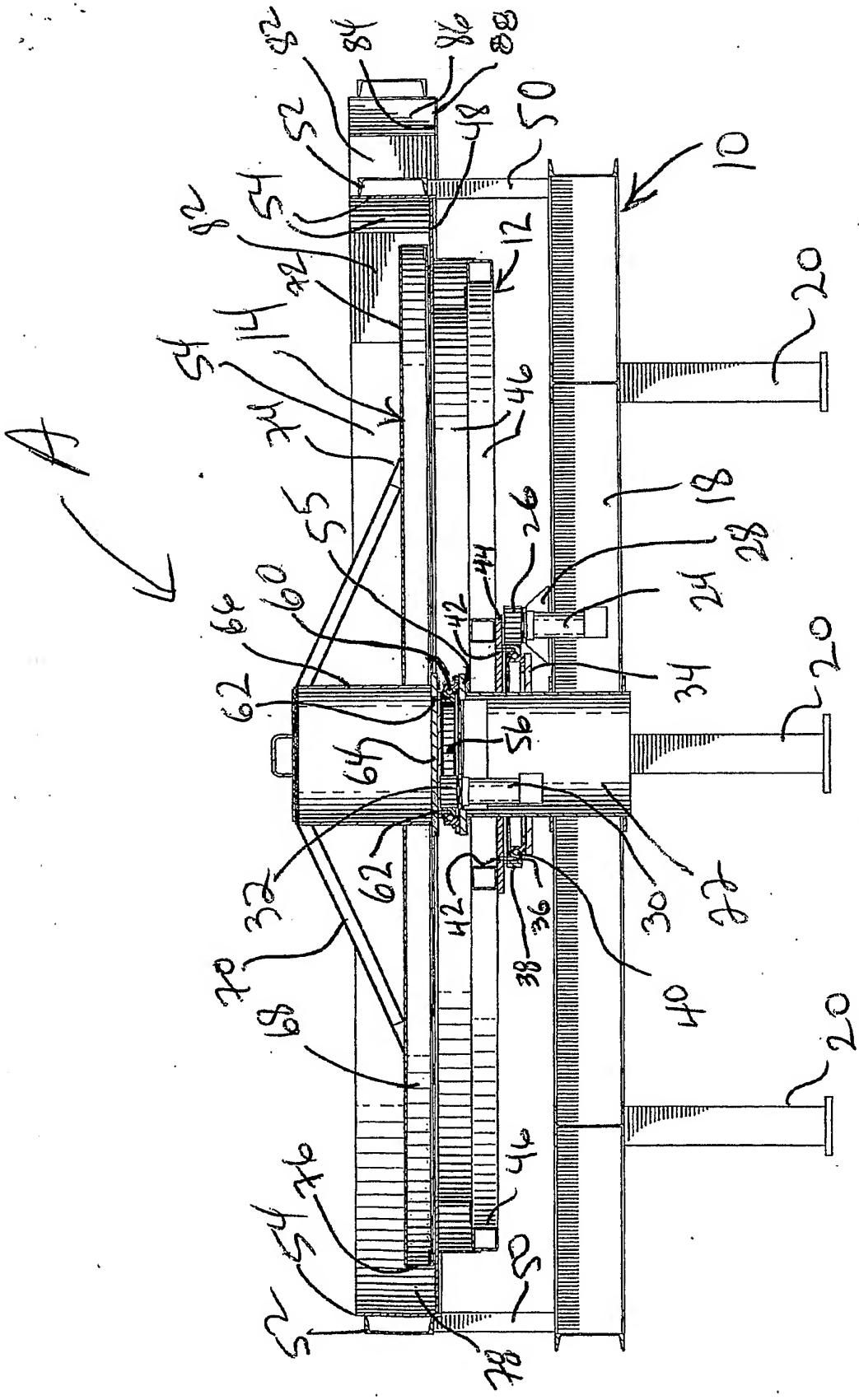
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FIG. 3

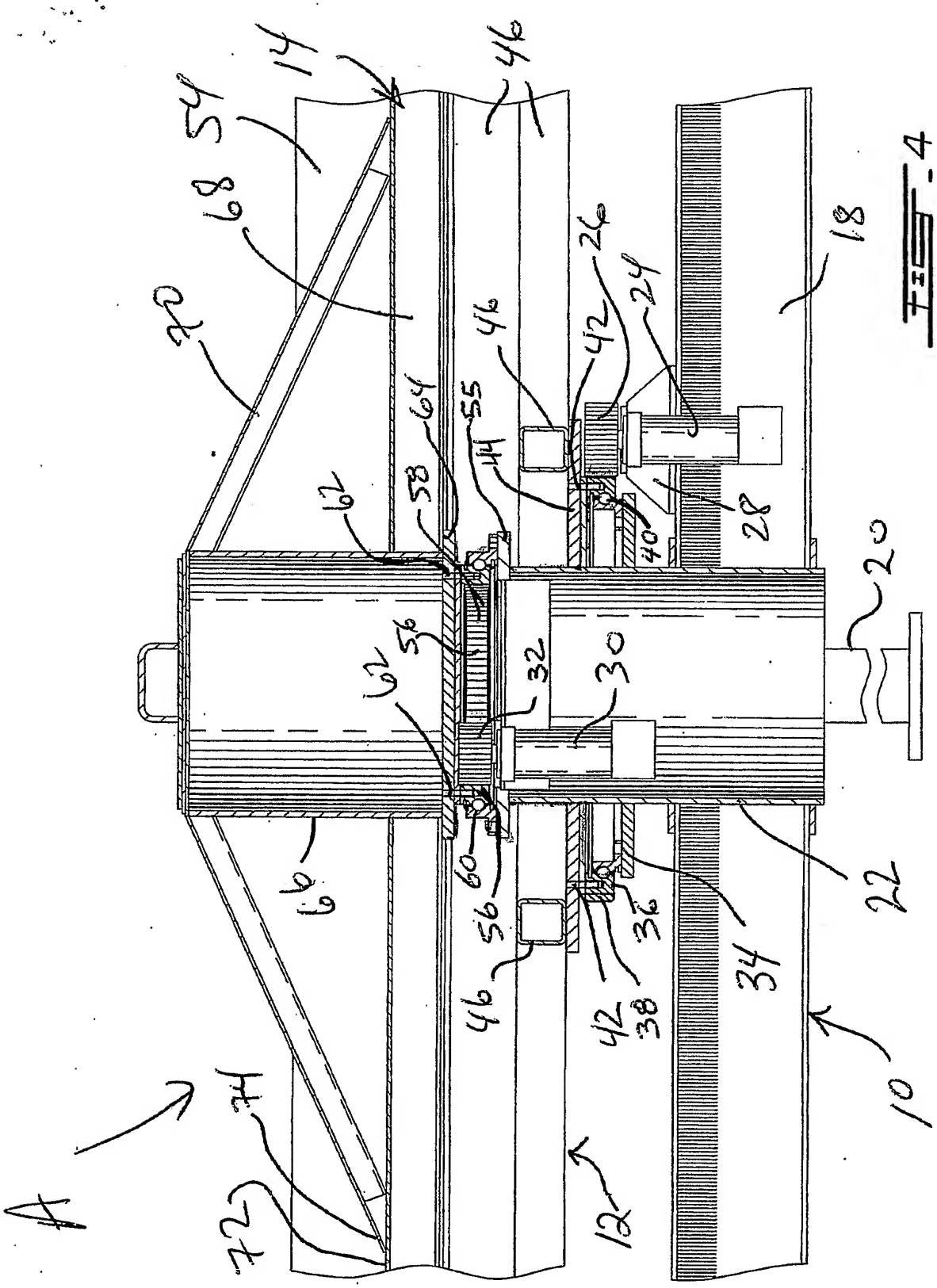
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Fig. 4

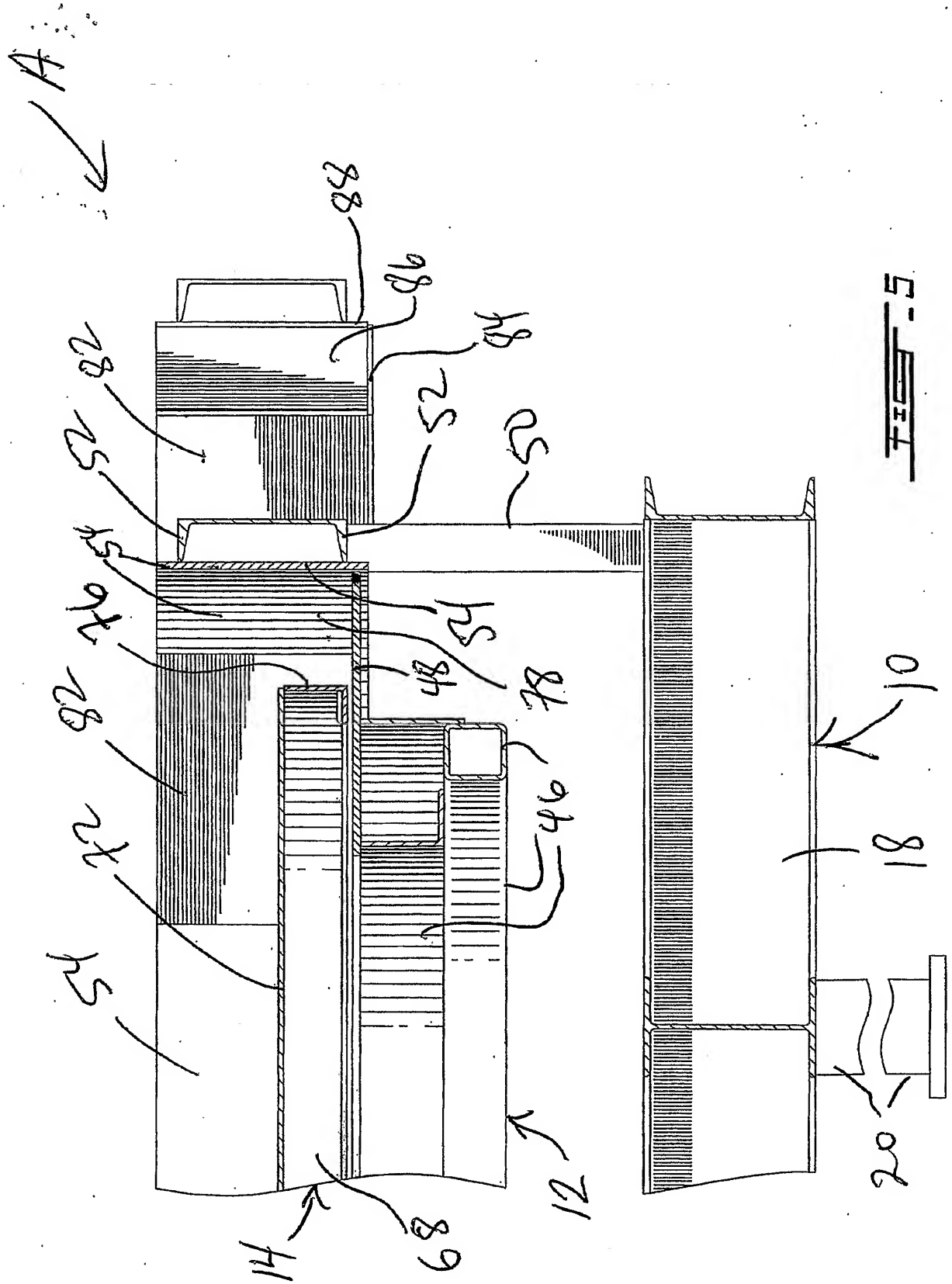
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FIG. 5

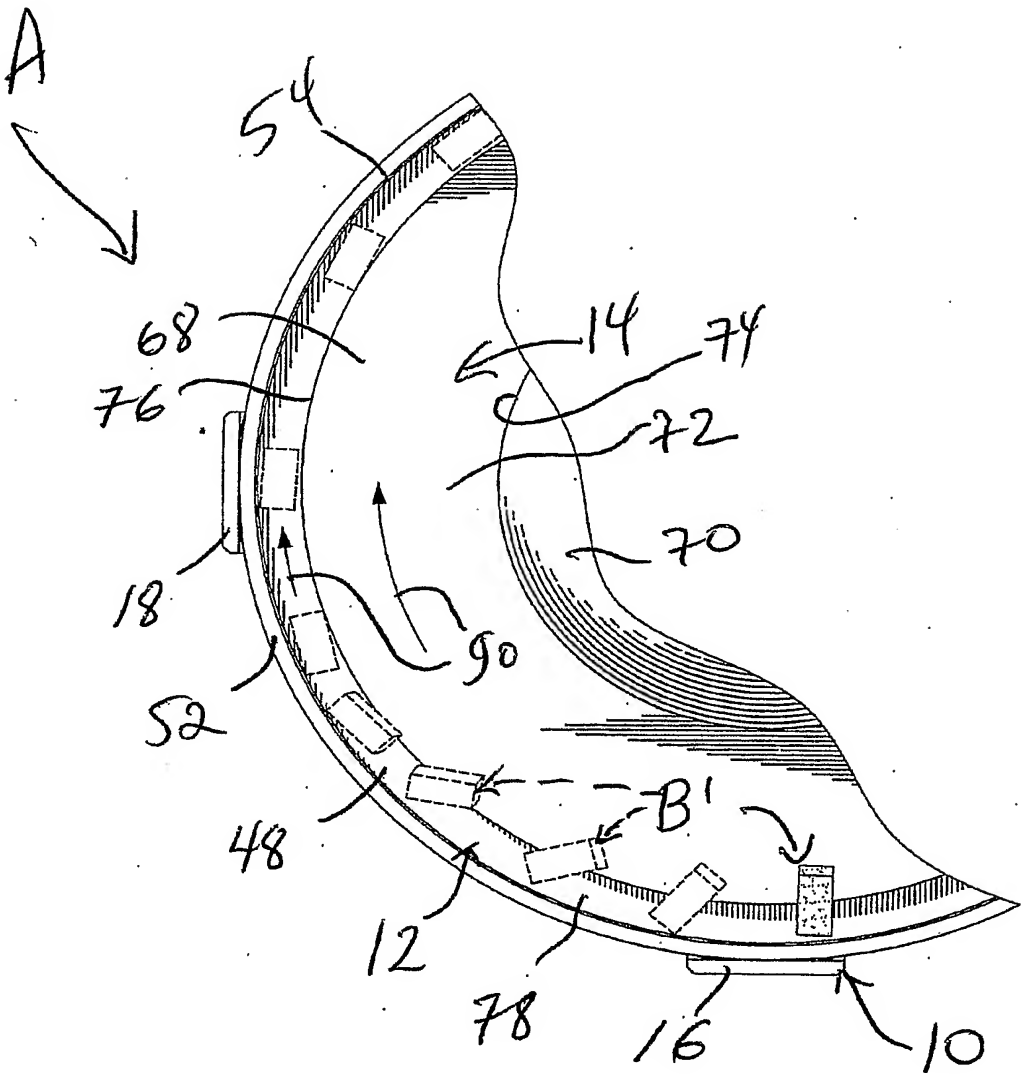

FIG. 6